REMARKS

Claims 1 and 3 have been canceled in favor of claim 22, to simplify prosecution. The dependencies of claims 2, 5, 6, 10 and 11 have been amended accordingly. Claims 4, 9, 15, 20 and 21 have been canceled.

Typographical errors in claims 5 and 16 have been corrected.

The remaining independent claims (12, 14 and 22) have been amended to further define the toluene diamine-initiated polyether(s). The oxyethylene content of these materials is now specified as being from 2 to 20 percent by weight, as supported by original claim 4. In addition, these materials are now specified as having at least 90% secondary hydroxyl groups.

New claims 23 and 24 introduce further details regarding the structure of the toluene diamine-initiated polyethers. These claims are supported at page 4 lines 11-14 of the specification.

The case now contains 22 total claims and 3 independent claims. No additional claims fees are believed to be required on account of these amendments.

Regarding the art rejection

The claims stand rejected as obvious over USP 6,831,110 to Ingold. The amended claims are believed to define subject matter that is clearly patentable over the Ingold reference.

The Ingold reference describes a method for producing dimensionally stable rigid polyurethane foams. Ingold's process focuses on a specific combination of polymerization catalysts. Ingold describes a variety of polyol, isocyanate and blowing agents that can be used in the foam-forming composition. Among the polyols Ingold describes are toluene diamine-initiated polyether polyols, which are described as preferred amine-initiated polyols in column 5 of the reference. At column 5 lines 60-63, Ingold mentions that the amine-initiated polyols can be produced by reacting the amine initiator with "any of the known alkylene oxides", of which ethylene oxide and propylene oxide are preferred. In column 6, Ingold states that ethylene oxide, propylene oxide or mixtures thereof are most preferred to make polyols generally. Ingold goes on to say that when mixtures of alkylene oxides are used, they can be used to produce a random or block copolymer.

In this invention, the selection of a specific class of toluene-diamine initiated polyols has been found to provide a good combination of properties. Those properties include low polyol viscosity, good thermal insulation (low k-factor) and good curing characteristics (as evidenced by post-demold expansion). Applicants have found that this combination of properties can be achieved through careful control of the number of oxyethylene groups in the toluene diamine-initiated polyol, and by selecting a toluene diamine-initiated polyol that has mainly secondary hydroxyl groups.

Although Ingold describes the selection of ethylene oxide, together with propylene oxide, as being "preferred", Ingold fails to differentiate between the two. Ingold fails to recognize, or suggest in any way, that the selection of one of these alkylene oxides over the other would make a significant difference in the results that are achieved. By indiscriminately lumping ethylene oxide together with propylene oxide, Ingold suggests only that the two oxides are equivalent. Ingold offers no reason to select one over the other for purposes of producing a rigid polyurethane foam.

The examiner's proferred reason for selecting varying the ethylene oxide content of a toluene diamine-initiated polyol, to vary the degree of rigidity/flexibility in products, does not appear in the Ingold reference or any other reference cited by the examiner. Furthermore, it does not seem to be based on any scientific reasoning. To applicants' knowledge, variations in ethylene oxide content do not vary the degree of rigidity/flexibility in rigid polyurethane foam products, which are instead controlled mainly by crosslink density, which is mainly a function of the equivalent weights and functionalities of the starting materials. The KSR decision does not relieve examiners of the duty to support their rejections with evidence, and it does not impose upon applicants a duty to affirmatively refute unsupported scientific hypotheses that examiners may assert to form a rejection. In this case, the examiner has not come forward with evidence to support his allegation that varying ethylene oxide content, within a prescribed range, would have been obvious to one of skill in the art.

Applicants have found that propylene oxide adducts of toluene diamine have a serious problem when they are processed into rigid polyurethane foams. They have viscosities that are so high that they cannot be processed reproducibly in commercial equipment. Therefore, although these polyols can provide for low k-factors and excellent curing properties (as shown, for example, in Comparative Sample C1 in applicant's

application) , they are too difficult to use in practice because of production inconsistencies. Ingold does not recognize either the problem nor any solution to this problem.

Applicants have further found that ethylene oxide adducts of toluene diamine lead to higher k-factors and much poorer curing, despite having a workable viscosity. This is shown in Comparative Sample C2 in applicant's application. Table 2, page 12 of applicants' specification shows how demold expansion deteriorates when ethylene oxide replaces propylene oxide in a toluene diamine-initiated polyol. Some loss of k-factor is also seen. The examiner is requested to look particularly at the demold expansion numbers in that table. In Comparative Sample C2, a thirty-fold increase in demold expansion is seen, compared to Comparative Sample C1. Again, Ingold fails to recognize this effect, and does not suggest any way to deal with it.

Applicants have found that one can get the best of both worlds, i.e., workable viscosities together with good k-factor and demold expansions, if the ethylene oxide content of the toluene diamine-initiated polyol is controlled with a certain range, and if the toluene-diamine-initiated polyol contains mainly secondary hydroxyl groups. The most direct comparisons to Comparative Samples C1 and C2 are applicant's examples 1, 4 and 7, in which the foam formulations are almost the same if not identical, but for the ethylene oxide content of the polyol. Examples 1, 4 and 7 all exhibit demold expansions that are only slightly higher than that of the control (Comparative Sample C1) but much lower than that of the all-ethylene oxide toluene diamine polyol of Comparative Sample C2. k-factors in each case equal or surpass those of Comparative Sample C2. Note that the effect, especially on demold expansion is much more than a simple averaging effect. Demold expansions for examples 1, 4 and 7 are all far lower than that which would be predicted from a simple averaging of the values for Comparative Samples C1 and C2.

This data shows (1) that ethylene oxide content in the polyol is results-effective and (2) there is a range of ethylene oxide contents that provides important and unpredictable advantages compared to ethylene oxide contents that are outside of that range. Ingold fails to recognize or suggest either of these things.

The results achieved with applicants' invention cannot be characterized as merely "optimization". Optimization can exist only when the changed variable or variables are known to be results-effective. There is no evidence that the ethylene oxide content of a toluene diamine-initiated polyol would have significant effects on either k-factor or demold expansion. As already discussed, Ingold equates propylene oxide and ethylene oxide in

polyols generally and in amine-initiated polyols as a class. Ingold therefore fails to teach or suggest that ethylene oxide content of a toluene diamine-initiated polyol is results-effective.

The invention as presently claimed is therefore novel and unobvious over the cited art, and is believed to be patentable for the same reasons as the parent case was patentable. A notice of allowance is respectfully solicited.

Respectfully submitted,
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